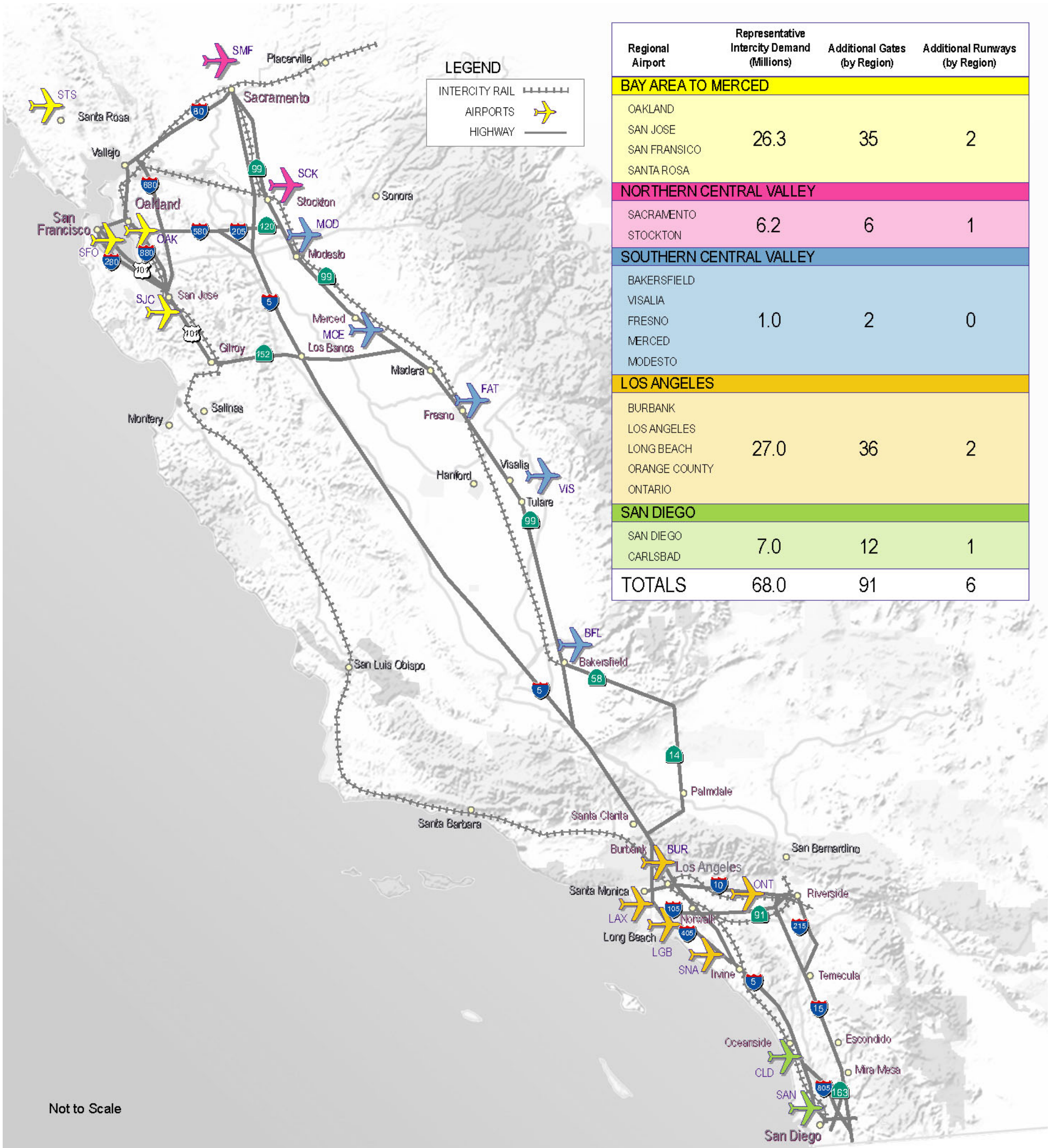
Figure 2.3 Modal Alternative – Aviation Component



Regional Airport	Representative Intercity Demand (Millions)	Additional Gates (by Region)	Additional Runways (by Region)
BAY AREA TO MERCED			
OAKLAND SAN JOSE SAN FRANSICO SANTA ROSA	26.3	35	2
NORTHERN CENTRAL VALLEY			
SACRAMENTO STOCKTON	6.2	6	1
SOUTHERN CENTRAL VALLEY			
BAKERSFIELD VISALIA FRESNO MERCED MODESTO	1.0	2	0
LOS ANGELES			
BURBANK LOS ANGELES LONG BEACH ORANGE COUNTY ONTARIO	27.0	36	2
SAN DIEGO			
SAN DIEGO CARLSBAD	7.0	12	1
TOTALS	68.0	91	6

Figure 2.4 High-Speed Train (HST) Alternative

- **"Base" HST Alternative –** HST service would be provided between San Francisco and Downtown San Diego via the Pacheco Pass, I-5/Grapevine, and Inland Empire, with a HST extension through the Northern Central Valley to Sacramento. Incremental service improvements would be made in the LOSSAN corridor. Stations would be in communities identified in the Systems Alternative Definition report for this alignment, and would generally be located in the downtown area of each community (except Stockton and Sylmar). HST operating features and costs would be as assumed for the Business Plan.

- **Palmdale Design Option –** This option is identical to the "base" alternative, except that the corridor would follow the Palmdale/Antelope Valley alignment (instead of

I-5/Grapevine) between Bakersfield and Los Angeles. An additional station would be provided in Palmdale.

- **Diablo Direct Design Option –** This option is identical to the "base" alternative, except that the corridor would follow the Diablo Range alignment (instead of Pacheco Pass) between the Bay Area and Central Valley. Stations in Gilroy and Los Banos are not included with this design option.

- **Irvine Design Option –** This option is identical to the "base" alternative, with the addition of a "stub" extension between Los Angeles Union Station and Irvine. Additional stations would be provided in Norwalk, Anaheim, and Irvine.

- **East Bay Design Option –** This option is identical to the "base" alternative, except that service north of San Jose would follow an alignment though the East Bay to Oakland, with additional stations at Fremont, Oakland Airport, and near Downtown Oakland. The East Bay alignment would be in addition to the "base" alignment along the Peninsula between San Jose and San Francisco. This design option would involve the same service levels as provided in the "base" alternative, with HST service north of San Jose evenly split between the Peninsula and East Bay alignments.

- **Outlying Stations Design Option –** This option is identical to the "base" alternative, with the San Diego terminus at East Mission Valley instead of Downtown San Diego. Central Valley stations in Modesto, Merced, Tulare, and Bakersfield would be placed at suburban locations that are outside of the existing downtowns.

Transportation demand and service levels for each mode and HST design option were also needed to analyze economic growth effects. For year 2020, transportation demand and service levels were derived with the HSRA's intercity travel demand model using results from sensitivity analysis #5d. The model results indicated that the HST Alternative includes approximately 255.4 million intercity and long-distance commute trips in 2020, including 68 million trips by HST. Auto travel times from sensitivity analysis #5d were further adjusted (using the travel time adjustment methodology described for the Modal Alternative in Appendix A) to account for the diversion of auto trips to HST. Separate model runs were made for the "base" and Palmdale and Diablo Direct design options. The East Bay and Outlying Stations design options used model results from the "base" alternatives. Demand and service levels for the Irvine design option were developed in a hybrid approach as described in Appendix B.

Transportation demand for HST in 2035 was estimated from year 2040 travel model results from the HSRA's intercity travel demand model. Year 2035 transportation demand for other modes was estimated by applying the mode specific annual growth rates from the Business Plan (sensitivity analysis #1) to the year 2020 model results, and adjusting to maintain consistency with trip totals for the No-Project and Modal Alternatives. Transportation service levels for 2035 were assumed to be identical to the year 2020 values, and, as with the other alternatives, it was assumed that transportation system investments would continue to be made in non-HST modes at a level sufficient to maintain the transportation service levels that would be experienced in 2020.

2.2.4 Service Phasing

Economic growth effects in any given year are sensitive to the length of time over which changes in economic conditions are assumed to occur. In terms of this analysis, the number of jobs or people that will be generated in an area in 2020 or 2035 is sensitive to the year in which HST service or some other transportation service is assumed to first be available to that area. Therefore, a number a planning assumptions regarding service phasing were made in order to identify the year in which travel changes would begin accruing in different areas:

- For the HST Alternative, HST service along the "trunk line" between San Francisco and Los Angeles Union Station would begin on January 1, 2016, for the "base" alternative and all design options. Service to San Diego and Sacramento would begin on January 1, 2019 for the "base" alternative and all design options. For the Irvine design option, service from Los Angeles Union and Irvine would begin on January 1, 2019. For the East Bay design option, service between San Jose and Oakland would begin on January 1, 2016.

- For the Modal Alternative, aviation and highway components that serve travel markets along the HST "trunk line" would open on January 1, 2016. This assumption would include airport and highway projects in all analysis counties except Sacramento, Yolo, San Joaquin, Stanislaus, and San Diego. All other elements of the Modal Alternative would open on January 1, 2019.

3.0 Evaluation Methodology

3.0 Evaluation Methodology

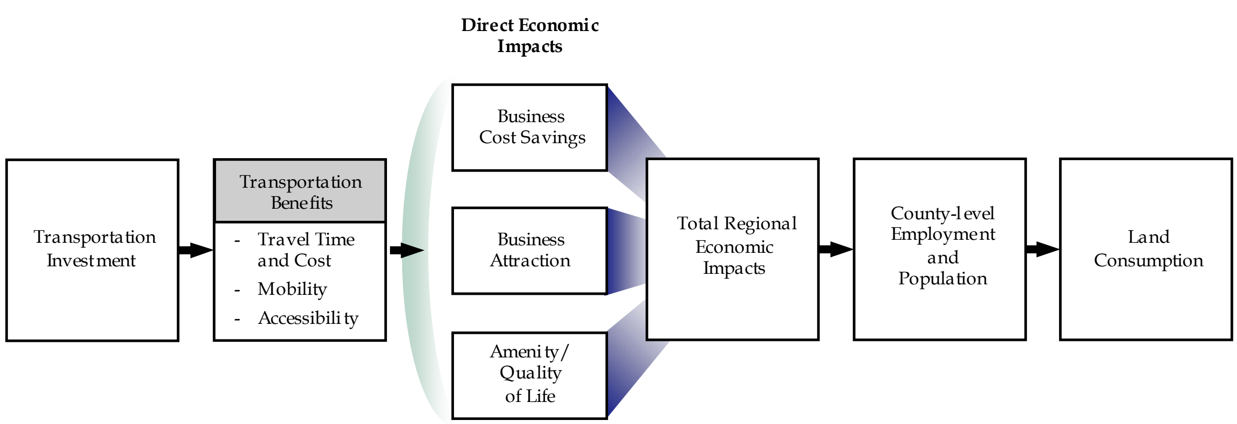
■ 3.1 Overview of Methodology

The analytical process to estimate the economic growth effects of the system alternatives requires significant modeling tools and data. Nonetheless, the entire process, which is depicted in Figure 3.1, can be summarized by a few key steps:

- **Define transportation investments –** This analysis considers the system alternatives and HST design options described in Section 2.0. Within this analysis, the future baseline conditions are assumed to represent the No-Project Alternative, and the economic modeling process is used to forecast the incremental changes of the Modal and HST Alternatives.

- **Estimate transportation benefits –** Using results from the HSRA's intercity travel demand model, estimate benefits, such as reduced travel times and/or costs of each system alternative for air, highway, or conventional rail trips. The quantification of travel time, cost, accessibility and societal (pollution or accident reduction) benefits reflects the mobility enhancement provided through system expansion with the Modal Alternative or additional travel options with the HST Alternatives.

Figure 3.1 Evaluation Methodology



- **Estimate direct economic impacts –** Direct economic impacts, which are generated from the transportation benefits of each alternative, generally fall into one of three categories:

  1. Business cost savings – Reductions in travel time and/or cost for long-distance business travelers and commuters benefiting from the transportation improvements;
  2. Business attraction effects – New and relocated firms taking advantage of market accessibility improvements provided through transportation investments; and
  3. Amenity (quality of life) changes – Non-business travel time and/or cost benefits and other societal benefits improve the attractiveness of a region.

- **Determine total regional economic impacts –** The direct economic impacts all have the potential to create additional multiplier effects on the regional and statewide economies of California. Total regional impacts were estimated using the Regional Economic Models, Inc. (REMI) macroeconomic simulation model. For this analysis, total economic impacts include population and industry-specific employment.

- **Allocate regional economic impacts to California counties –** A county-level post-processor was developed to allocate regional employment and population impacts to California counties. The primary drivers of the post-processor are the magnitudes of direct economic impacts (generated at the county level), but adjustments are made to reflect economic multiplier effects and population movements from improved long-distance commuting accessibility (especially for counties with HST stations).

- **Estimate land consumption –** County-level population and employment were allocated throughout each county to determine the infill potential and magnitude of currently undeveloped land needed to accommodate growth for each alternative. This analysis was driven by three key pieces of information:

  1. Local land use, zoning, and employment data;
  2. National and international experience with station-area development trends related to HST and fixed guideway transit; and
  3. County-level industry employment and population estimates.

The remainder of Section 3.0 is divided into two parts that focus on statewide and regional growth effects (i.e., population and employment estimates); and local and station area growth effects (i.e., land consumption).

3.2 Statewide and Regional Growth Effects

3.2.1 Evaluation Elements

This section is organized into four parts. The first part describes the development of population and employment forecasts to represent the No-Project Alternative, and to use as input to the economic modeling process. The second and third parts summarize the concepts that underlie how transportation improvements lead to economic benefits for the HST and Modal Alternatives. The fourth part describes how travel time, cost, and accessibility changes lead to the three categories of direct economic benefits and, ultimately, to total economic benefits.

Base Forecasts for Population and Employment

The growth effects analysis requires forecasts of future population and employment for the 2020 and 2035 analysis years. As noted previously, this forecast represents the No-Project Alternative for the analysis years, and is also used as an economic modeling input to estimate incremental population and employment changes of the other system alternatives. Given the products required from this analysis, it was necessary to develop county-level population and employment forecasts for 2020 and 2035, with employment broken out by one-digit Standard Industrial Classification (SIC) codes.

The California Department of Finance (DOF) prepares county-level population forecasts for each year through 2040. However, there is no similar official state employment forecast at the county level, and no single source of employment projections provides sufficient industry, geographic, or time detail. Therefore, the No-Project employment forecasts were developed through a combination of multiple sources. The following sections provide a brief description of the No-Project population and employment forecasts. The No-Project forecasts are displayed in Table 3.1.

Population

The DOF forecasts were used directly as the No-Project population forecast for this study since they represent a semi-official source of population projections for the State, and their use in this analysis would be consistent with the approach used in earlier HST studies.

Table 3.1 Population and Employment Forecasts for the No-Project Alternative

County	2020		2035	
	Population	Employment	Population	Employment
Alameda	1,793,139	1,212,510	2,004,985	1,273,557
Contra Costa	1,104,725	689,388	1,227,082	723,006
San Francisco	750,904	868,839	705,619	918,391
San Mateo	855,506	610,977	930,793	636,802
Santa Clara	2,196,750	1,675,268	2,498,528	1,785,474
Solano	552,105	242,957	661,762	251,790
Bay Area*	7,253,129	5,299,940	8,028,769	5,589,020
Madera	224,567	96,090	312,674	149,752
Merced	319,785	114,429	421,175	164,898
Sacramento	1,651,765	984,230	2,002,082	1,037,902
San Joaquin	884,375	412,117	1,153,260	502,655
Stanislaus	708,950	301,832	920,782	383,284
Yolo	225,321	150,767	278,724	174,955
North Central Valley*	4,014,763	2,059,465	5,088,697	2,413,446
Fresno	1,114,403	602,722	1,411,889	688,186
Kern	1,073,748	453,251	1,468,936	522,862
Kings	186,611	66,645	244,219	74,942
Tulare	569,896	224,268	761,893	248,178
South Central Valley*	2,944,658	1,346,886	3,886,937	1,534,168
Los Angeles	11,575,693	6,699,802	13,302,934	7,406,409
Orange	3,431,869	2,656,136	3,910,017	2,870,740
Riverside	2,773,431	1,076,667	3,983,299	1,162,051
San Bernardino	2,747,213	1,128,243	3,798,899	1,220,510
San Diego	3,917,001	2,606,408	4,789,883	2,867,144
Southern California*	24,445,207	14,167,255	29,785,032	15,526,855
Rest of State	6,790,870	3,563,921	8,420,610	3,809,552
Statewide Total	45,448,627	26,437,467	55,210,045	28,873,042

Source: Cambridge Systematics, Inc., 2003.

Employment

Employment data for the No-Project Alternative were developed by combining forecasts from Caltrans and Woods and Poole[1] (W&P) and through application of the REMI model. The Caltrans forecasts had recently been developed and provided county-level estimates by one-digit SIC code to 2020. Since the Caltrans forecasts do not account for all employment (i.e., they miss the self-employed and other groups), W&P data were used to obtain the level of employment for all industries. The employment concept used by W&P is consistent with the U.S. Bureau of Economic Analysis full-employment data.

The 2020 No-Project forecast was developed from year 2002 W&P employment estimates and year 2002-2020 industry-specific growth factors inferred in the Caltrans forecasts. These No-Project forecasts were used to adjust year 2020 employment values within the REMI model, with the REMI model then used to forecast employment changes from 2020 to 2035. These 2035 estimates essentially are a long-run extrapolation from the 2020 Caltrans/W&P estimates. These estimates were compared to historical averages and regional-level forecasts (from various councils of governments and metropolitan planning organizations) to ensure that the resulting employment-to-population ratios for 2020 were within a reasonable range.

Benefits of Transportation Improvements for the HST Alternative

Economic analyses of transportation investments necessarily begin with a clear conceptual estimate of changes to transportation demand and service levels (i.e., travel times and costs) over time and between alternatives. These demand and service level changes lead to different types of economic benefits. The primary benefits that were considered in this analysis include the following:

- **User travel efficiency benefits (travel time and cost savings, induced trips).** Benefits for users of the HST system were estimated separately for intercity HST business users, intercity HST non-business users, and long-distance commuters on HST. The benefits essentially compare the out-of-pocket costs of travel and travel time by mode to discern the benefits of transportation improvements[2]. These benefits are quantified through a process known as a log sum calculation. This process closely follows

[1] Woods and Poole is a private economic forecasting firm that produces employment (and other economic indicators) at the one-digit SIC level for historical years starting in 1970 and forecast years ending in 2025 for every county and state in the country.

[2] As an example, a HST trip between San Francisco and Los Angeles may take slightly more time than traveling by air but be less expensive enough to make HST an attractive option. Conversely, when compared to an auto trip on the highway, HST is likely more expensive, but typically reduces travel times between cities in California. In addition, some travelers value the productivity (e.g., ability to read, work on a computer, use a cell phone); comfort (e.g., eat, meet people, travel in comfort); and/or safety (e.g., avoid accidents or the fear of accidents) provided by HST on top of pure travel time and cost considerations. Finally, the calculation estimates the benefit that travelers receive by having an additional travel from which to choose.

procedures employed on earlier HST studies.[3] The computation methodology is described in more detail in Appendix C.

Benefits were also estimated for potential long-distance commuters on HST. The benefits of diverting auto-based commute trips to HST were estimated using urban area model results for the Bay Area, Los Angeles, and San Diego areas; and combining the resulting travel time savings with "value of time" estimates for commuters in each area. Appendix D provides further detail on this process.

Travel efficiency benefits are also generated by induced trips.[4] Since these new travelers were previously content not to travel, the average user benefit for induced trips is less than for those who switch mode from air, highway, or conventional rail to HST. Using consumer surplus theory, the average benefit for induced travel is one-half the benefit for a similar county-to-county trip for a mode switcher. Estimation of induced trips uses a weighted average of switchers from automobile and air, based on the proportion of induced trips using each of these modes.

- **Non-user travel efficiency benefits (auto and air delay savings, air operating cost savings).** To the extent that HST diverts traffic from highways and airports to HST, it frees up highway and airport capacity and leads to travel efficiency benefits in the form of reduced travel times. The magnitude of reduced airline passenger delay, reduced aircraft operating delay, and reduced highway delay was estimated based on the assumptions outlined in Section 2.0 and Appendix A, including the following:

  - Auto in-vehicle times would be reduced by 4.1 percent to account for the diversion of trips from auto to HST.
  - The diversion of trips from air to HST would lead to a reduction in in-state flights, thereby, decreasing delay at California airports for remaining flight operations. These air delay reductions would provide benefits to travelers and the airline industry due to reduced aircraft operating delays.

  Further details on these procedures are provided in Appendix D.

- **Market accessibility benefits (labor, customer, buyer, and supplier).** Beyond pure travel efficiency benefits, HST may also lead to accessibility improvements to labor, customer, buyer, and supplier markets. The accessibility benefits are one of the main drivers of the business attraction analysis. Improvements in accessibility interact with

[3] *Independent Ridership and Passenger Revenue Projections for High-Speed Rail Alternatives in California*, Appendix C, Charles River Associates, January 2000; *Economic Impact and Benefit/Cost of High-Speed Rail for California*, Final Report, Economics Research Associates, September 1996.

[4] Induced trips are generated by the enhanced mobility option provided by HST whereby travel that normally would not occur will now be made due to the presence of HST. Travel forecasts prepared during preparation of the HSRA's *Business Plan* indicate the potential for approximately 2.6 million induced trips.

local economic characteristics, including land and labor costs and workforce characteristics, to determine the overall level of economic benefit associated with improved transportation networks. Accessibility is measured not based on the number of trips, but rather by the increased reach to population, employment centers and other attractions (e.g., airports) afforded through improved travel times and lower costs. Increased reach to buyer and supplier markets, for example, is defined as the amount of employment that can be reached within a three-hour trip, while labor market accessibility was assumed to be within a 90-minute trip. The entire market accessibility and business attraction process are described in Appendix E.

- **Societal benefits (accidents, air quality).** Any auto travel reductions for the HST Alternative could lead to secondary societal benefits, including reduced highway air pollution and reduced highway crash costs. These benefits were estimated by multiplying reductions in highway vehicle-miles traveled (VMT) by estimates of the marginal societal cost of auto crashes and air pollution. This analysis relied on marginal costs that were assumed in previous HST studies,[5] including $0.0599 per VMT (1999 dollars) for auto crashes and $0.0079 per VMT (1999 dollars) for pollution.

Benefits of Transportation Improvements for the Modal Alternative

The estimation of transportation benefits is slightly different for the Modal Alternative compared to the HST Alternative. Since there is no new mode under the Modal Alternative (rather improvements to existing modes), the calculation of benefits generally follows the procedures outlined in the previous sections for non-user travel efficiency benefits, market accessibility benefits, and societal benefits (or disbenefits, if highway travel increases). The magnitude of non-user travel efficiency benefits reflected several key assumptions for the Modal Alternative, as outlined in Section 2.0 and Appendix A, including the following:

- Auto in-vehicle times for intercity trips would be reduced by 7.5 percent within the Bay Area and Southern California, 9.5 percent within the Central Valley, and 8.5 percent between regions to account for highway capacity increases.

- Air out-of-vehicle times would be reduced by 30 minutes for trips to or from the San Joaquin Valley, and 15 minutes for all other intrastate trip interchanges to account for the potential of increased flight frequencies that would be possible given the airport improvements of the Modal Alternative.

- The terminal and runway improvements could decrease delays at California airports for all flight operations. These air delay reductions would provide benefits to travelers and the airline industry due to reduced aircraft operating delays.

The Modal Alternative is assumed to serve the same *representative intercity travel demand* as the HST Alternative, including the 2.6 million trips induced by a potential HST service.

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[5] *Independent Ridership and Passenger Revenue Projections for High-Speed Rail Alternatives in California*, Appendix C, Charles River Associates, January 2000.

Induced travelers again receive one-half the benefit for an existing trip for a particular mode according to consumer surplus theory.

Direct Economic Effects

Each of the benefits described above enters one of three variables in the REMI model:

1. **Production cost savings by industry –** Dollar value of cost savings over time due to improved HST, air, and highway travel;

2. **Business attraction benefits by industry –** Number of new employees by industry, phased in over 10 years; and

3. **Amenity changes by region –** Dollar value of societal benefits that increase the livability and attractiveness of California regions.

The benefits were estimated for two forecast years (2020 and 2040) and interpolated between years to create a complete stream of business cost savings over time. Detailed benefit estimates for these two forecast years are presented in Appendix F. Benefits were also assumed to "ramped-up" over a three-year timeframe to account for the service phasing assumptions described in Section 2.2.4. Figure 3.2 displays the allocation of benefits to each of the three REMI inputs. Furthermore, public financing costs are used to reduce the appropriate categories of consumer expenditure in the REMI model to determine the full economic effects of the Modal Alternative.

Production Cost Savings

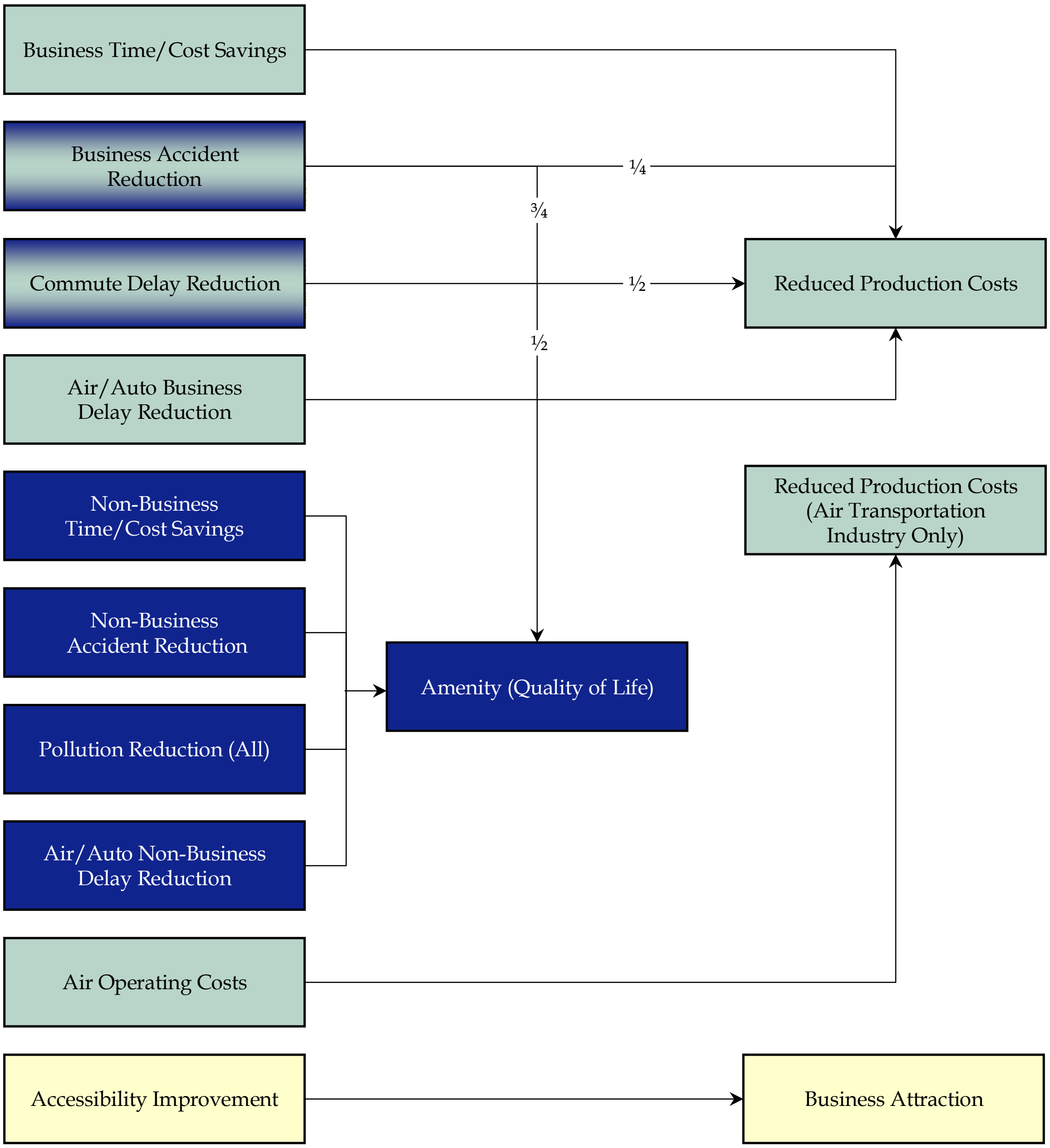
The business trip portion of the travel efficiency benefits lead to production cost savings in terms of increased competitiveness, increased profitability, and the expansion of firms already located in California. Production cost savings can be thought of as a *first-order* economic effect, as these benefits accrue directly to California firms simply by using a more efficient means of travel.[6]

Production cost savings in this analysis arise from four sources:

1. Travel time and cost savings for intercity business travelers and commuters;
2. Air and highway delay savings for business travelers;

[6] It is important to distinguish between the technical definition of productivity in economics and the use of the term in this context. The *mobility option* of working, while one travels, does not change the underlying mix of labor and capital that businesses use to produce a unit of goods or services. This mix of production factors (which also includes energy) determines a business' productivity.

Figure 3.2 How Benefits Accrue to REMI Inputs



3. Accident reductions for business travelers; and
4. Aircraft operating savings, which accrue only to the air transportation industry.

Though all of the HST user benefits estimated for business travelers are considered production cost savings in REMI, only one-half of the commute benefits and one-quarter of the accident benefits is treated as production cost savings. The remainder of these two categories of benefits is treated as amenities in REMI. This assumption is consistent with the urban planning literature and standard economic modeling practice.

The production cost savings were allocated one-half to origin counties and one-half to destination counties. The saving is then allocated to industries within the State to perform the economic impact analysis. The allocation of cost savings to industries varies by mode and region based on the following key factors:

- Industry size – Employment and output;
- Transportation usage by mode by industry from the Transportation Satellite Accounts[7]; and
- Percent of transportation expenditures that are of a passenger nature, rather than freight, by industry.[8]

Business Attraction

A potential also exists for firms to change their location and expansion decisions based upon improved accessibility afforded by the HST or Modal Alternative. These business attraction effects include the citing of new activities that would otherwise be located outside the HST regions, either elsewhere in California, or elsewhere in the U.S. These business attraction effects are driven by improvements in accessibility to customers, workers, and international airports. These improvements have the effect of expanding the effective market areas of HST regions, reducing costs associated with accessing non-local markets, or reducing costs and improving quality of available inputs; and, thus, are key factors in shaping business growth in an area. A business attraction model (see Appendix E) was applied to capture how incremental improvements in market access and cost interact with the existing local economic base and characteristics to generate new employment in the HST regions.

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[7] The most up-to-date Transportation Satellite Accounts (1996) were used in this study. They are jointly produced by the U.S. Bureau of Transportation Statistics and the U.S. Bureau of Economic Analysis.

[8] Estimated using the U.S. Bureau of Economic Analysis national input-output matrix, capturing business travel expenditures by industry (e.g., hotels, eating/drinking, transportation).

Quality of Life/Amenity

Several transportation benefits do not directly affect business competitiveness, but still provide meaningful, quantifiable benefits that affect the quality of life and attractiveness of the State. This analysis incorporated the following five categories of benefits into an "amenity" component for economic modeling purposes:

1. Travel time and cost savings for intercity non-business travelers;
2. Air and highway delay savings for non-business travelers;
3. Commuter highway delay reductions (portion not accruing to production cost savings);
4. Air pollution reductions from changes in highway VMT; and
5. Highway accident reductions from reduced highway VMT (portion not accruing to production cost savings).

Positive changes to the amenity component within REMI make a region more attractive for residential population, and typically lead to net positive impacts on migration and, therefore, higher levels of population growth. As with production cost savings, the amenity benefits are allocated one-half to origin counties and one-half to destination counties.

Public Financing Effects of the Modal Alternative

In any analysis of public investments, it is important to consider the likely sources of public financing and how it may affect future public revenue needs (i.e., government expenditures) and consumer spending. The Modal and HST Alternatives are both projected to have significant capital costs. Preliminary analysis suggests that the total capital cost of the HST Alternative would be on the order of $25 billion, while the capital cost of the Modal Alternative is roughly estimated to be on the order of $56 billion. Both cost estimates are in excess of the costs needed to fund the No-Project Alternative.

For the purposes of this analysis, it was assumed that the total cost of the HST Alternative and the first $25 billion in cost for the Modal Alternative would be funded through revenue sources that would not require direct tax increases or significant diversion of General Fund revenues. Examples of these revenue sources include general obligation bonds,[9]

[9] The debt service on General Fund State Revenue bonds is often paid through a commitment of the general fund revenue with no additional tax or other revenue source. A preliminary analysis by the project team suggests that the annual debt service on a $10 billion bond may be within the range of the state's historical and future bonding patterns. While this source of funding does not directly increase taxes, it does divert State expenditures from any number of budget items to debt service. Nevertheless, this diversion is not assumed in this analysis to result in any significant reduction in State expenditures.

Federal grants or loans, existing airport user fees and passenger facility charges, private sector participation, local funds (from existing sources), and existing state transportation revenue sources (e.g., gas tax, sales tax on gas, etc.).

The remaining cost of the Modal Alternative, about $31 billion (in year 2002 dollars), is assumed to come from revenue sources that have traditionally been used for highway and aviation improvements in California, including the following:

- The highway component ($15.5 billion) is assumed to be funded through a 20-year increase in the state's gas and diesel taxes. Since each penny of the gas tax generates about $110 million per year,[10] a seven-cent fuel tax is assumed to be in place to raise the $775 million per year.

- The aviation component ($15.5 billion) is assumed to achieve one-half of needed funding ($7.75 billion) through the Federal Airport Improvement Program.[11] The other one-half is assumed to be funded through an addition to the gas tax ($65 million or 0.6 cent tax), local general funds ($65 million), passenger facility fees ($130 million), and airport revenue bonds ($130 million).

These additional funding requirements for the Modal Alternative will divert consumer expenditures to pay for increased gas taxes and higher airport fees, as well as reduce state and local government spending in other areas to cover bonds and grants. These direct impacts enter the REMI model, either as a reduction in local and state government spending or as an increase in transportation costs. This later component is split explicitly into increased fuel costs (to cover gas tax increases) and a general increase in transportation costs (to cover passenger facility fees and airport revenue bonds).

3.2.2 Evaluation Process

Total Regional Economic Impacts – REMI

The various direct economic effects are used as inputs to the REMI simulation model.[12] The REMI model used in this study is a five-region model composing the State of California, with 53 industry-sector detail – similar to models used throughout the State and in earlier

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[10] *Transportation Funding in California*, Caltrans Office of Transportation Economics, March 2002.

[11] This assumption is less than the maximum Federal participation for large airport projects (75 percent), but is more in line with funding programs for recent airport improvements in California. For reference, see *Airport Improvement Program Handbook*, Federal Aviation Administration, May 2002.

[12] The REMI model is a regional economic impact analysis model that can be used to estimate the macroeconomic impacts of policies or investments that change some aspect of the business climate in the region. It is the most widely used and accepted economic impact tool in the country, with unique capabilities for transportation analyses.

versions of the HST study. REMI generates control forecasts and simulates policy changes based on a series of linked socioeconomic variables representing industry output, demand for goods and services, labor supply, wages and prices, and industry market shares. REMI generates voluminous economic impact data, but the focus of this study was on the total employment, employment by industry, and population results.

Economic Analysis Regions

California's 58 counties were grouped into five regions for the REMI analysis in order to reflect the presence of components of the HST or Modal Alternatives in a county,[13] to reflect the economic interdependence between certain counties, and to relate to well understood geographic regions in California. The 10 Central Valley counties were split into north and south regions based on each county's economic relationship with either the San Francisco Bay area (Northern Central Valley) or the Los Angeles/San Diego region (Southern Central Valley). The five REMI regions and associated counties, which are displayed in Figure 3.3, are the following:

1. **Bay Area –** Alameda, Contra Costa, San Francisco, Santa Clara, San Mateo, and Solano Counties;

2. **Northern Central Valley –** Madera, Merced, Sacramento, San Joaquin, Stanislaus, and Yolo Counties;

3. **Southern Central Valley –** Fresno, Kern, Kings, and Tulare Counties;

4. **Southern California –** Los Angeles, Orange, Riverside, San Bernardino, and San Diego Counties; and

5. **Rest of California –** The remaining 37 counties that were not included in one of the other four regions.

Estimating Employment and Population by County

A "post-processor" was developed to disaggregate the REMI regional totals to the individual county level for the 21 counties that were in one of four core REMI regions. This disaggregation was based on two key factors:

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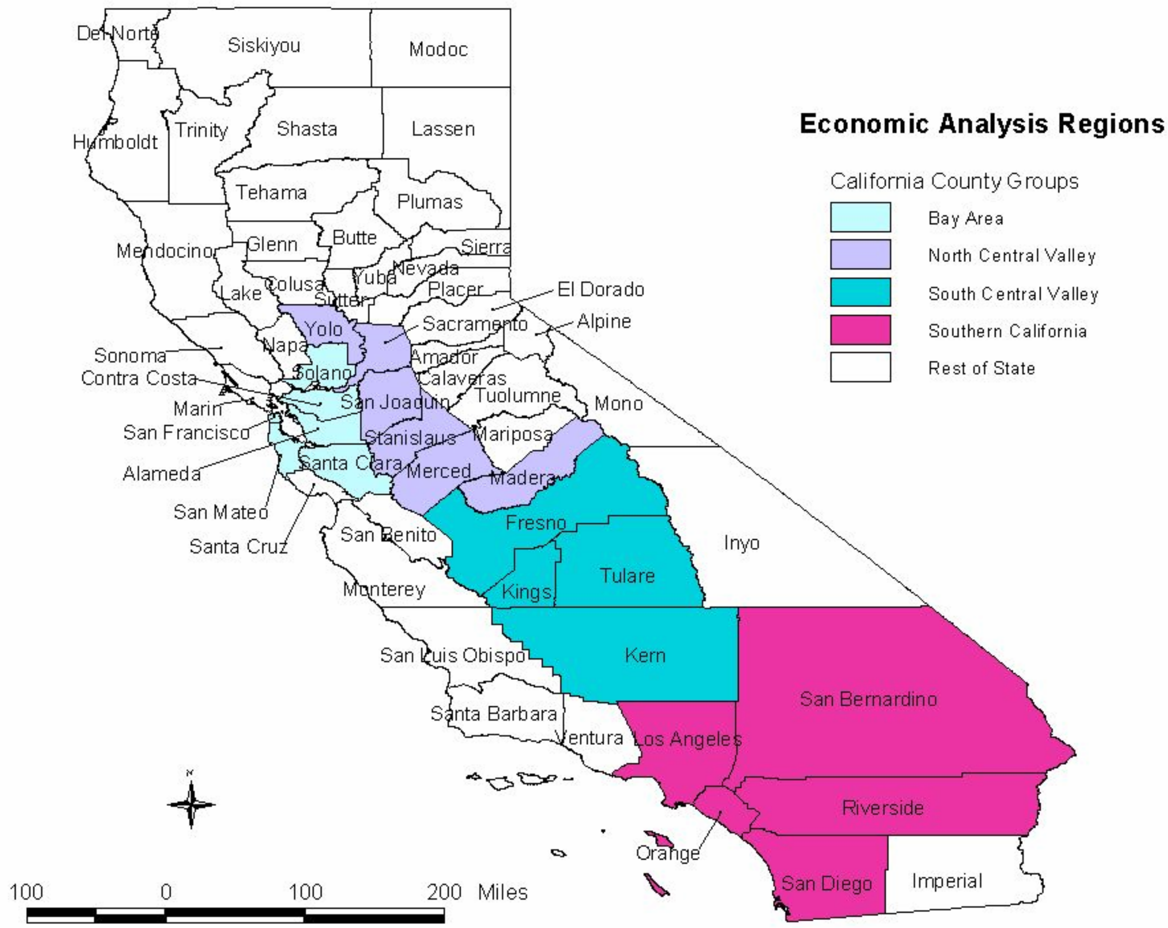
[13] All counties that had either an HST or Modal alternative improvement were grouped into one of the four core regions. "Rest of California" includes all counties without either an HST or Modal Alternative improvement.

Figure 3.3 Five Regions Used for Economic Modeling



1. The relative contributions of production costs, amenity benefits, and business attraction to the overall regional impact; and

2. The share of production costs, amenity, and business attraction benefits associated with each county.

Estimates of the contribution of each factor to the overall regional effect were calculated using the results of four REMI modeling runs, which captured the independent effect of each of the three factors on employment and population, and the total effect of the three factors combined. Based on these runs, a set of weights was assigned to each of the three factors for each region. These weights were then combined with each county's share of the total regional factor to yield an estimate of total employment and population impact by county.[14]

A second set of adjustment calculations were also performed to capture potential intraregional shifts in housing patterns[15] – and, thus, county population – associated with the introduction of HST.[16] Estimation of these population shifts involved a multi-stage process aimed at identifying the set of likely residential shifts made possible by the introduction of HST:

- Travel costs for each origin-destination (O-D) possibility were generated for both automobile and HST travel;
- Travel costs for each county pair were then compared in order to generate a set of "cost-effective" shifts between residential sites; and
- This set of "cost-effective" shifts was further narrowed based on a number of decision rules, including the criterion that, for a shift to be affected, the "new" county had to have lower housing costs than the original county.

After implementation of the decision rules, the set consisted of all O-D pairs with lower transportation and housing costs than an existing O-D commute pair. In the northern regions, these possibilities are introduced primarily for workers living in counties surrounding Merced, who now have the option of moving to Merced and realizing lower transportation and housing costs. In the southern regions, potential shifts were identified for movements from Riverside and Orange to San Bernardino County.

After each pair was identified, intercounty commute flow data were gathered from the year 2000 Census and associated forecasts that were developed for 2020 and 2035. These data were used to estimate the number of workers that would likely shift their choice of residence county (i.e., origin county) based on the possibility of realizing lower transportation and housing costs. Based on these estimates, population forecasts were adjusted to reflect the shift in residential patterns. Finally, the likely employment effects of these population shifts were calculated based on estimates of the number of jobs an average

[14] For example, if business attraction effects in a region accounted for 40 percent of the total employment impact, production costs 40 percent, and amenity benefits 20 percent; and 10 percent of the business attraction effect, five percent of the production cost savings, and five percent of the amenity benefits were associated with a particular county, this County's share of regional employment was estimated to be seven percent (0.4*0.1 + 0.4*0.05 + 0.2*0.05).

[15] Interregional shifts in future housing location (e.g., from Santa Clara County to San Joaquin County) were captured in the REMI model. However, the REMI model could not account for intraregional shifts in future housing location (e.g., from San Joaquin County to Merced County).

[16] Intraregional housing shifts are not likely to occur with the Modal Alternative since the highway improvements will create a fairly uniform change in travel time and cost among all counties. The HST Alternative, on the other hand, has the potential to create meaningful differences in travel time and cost savings among counties.

person supports in their county of residence by contributing to the local tax base, shopping at local stores, and availing themselves of local services.

3.3 Local and Station Area Analysis

The county-level population and employment forecasts served as a key input for conducting a detailed assessment of potential local and station area growth effects. This local area analysis focused on the concept of *land consumption*, or the amount of "new" land that would be needed to accommodate projected growth in each county. Essentially, the analysis provided an estimate of the population and employment growth that can fit within the currently urbanized areas of each county, and additional acreage of currently undeveloped land that would need to be converted to urbanized densities to accommodate any remaining growth.

The analysis of these localized effects was guided to a large extent by international experience in HST station area development, and a more fine-grained analysis of the effects of population and employment growth and development pattern changes on the land area required to accommodate urban functions. This work was organized into three basic steps:

1. A review of station area development experience in Europe, Japan, and the United States;

2. Estimation of land area required to accommodate forecast employment growth for each alternative; and

3. Estimation of the land area required to accommodate forecast population growth (residential land use) for each alternative.

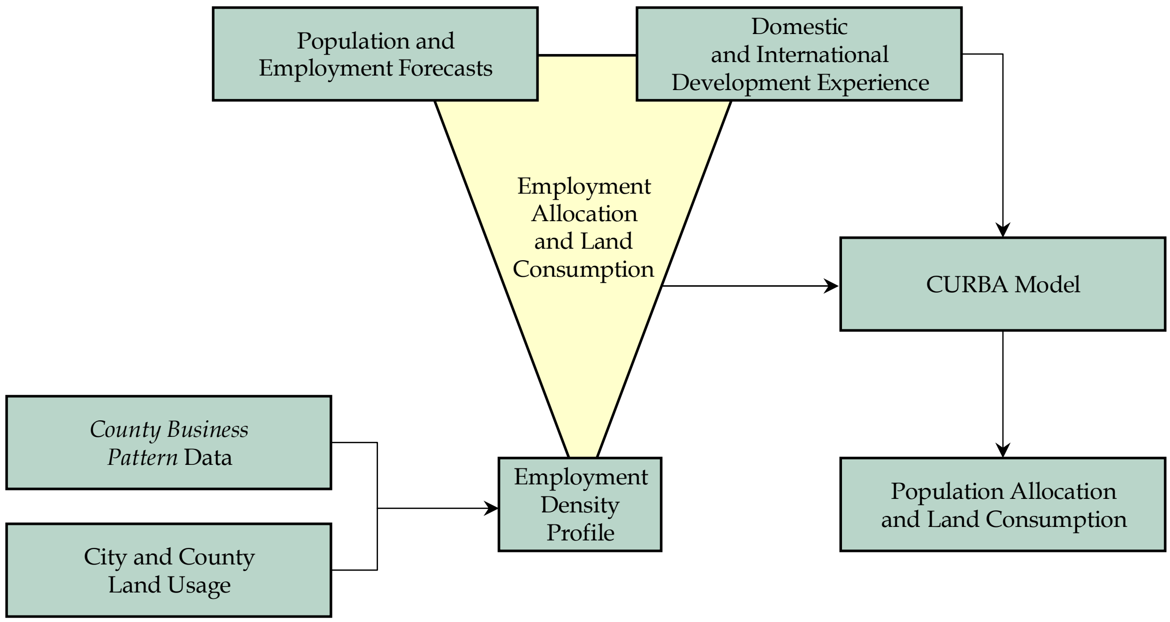
These general steps are depicted in Figure 3.4 and discussed in the following sections.

Review of Station Area Development Experience

An initial effort was undertaken to identify patterns of experience related to real estate development responses following introduction of HST. This review was intended to help determine the extent to which the HST Alternative could be expected to alter trend or market-based development patterns in communities with an HST station.

This effort, which was undertaken by the project team specifically for this project, included interviews and/or site visits for TGV stations in France, Shinkansen stations in Japan, and several major Amtrak stations in the United States. The domestic research also included station locations where significant increases in local and regional rail transit accessibility have occurred in the last 20 to 30 years, including several locations in California. A companion effort involved a review of literature related to station-area and

Figure 3.4 Land Consumption Analysis Process



transit-oriented development experience in California, including a number of field studies and research reports prepared by the University of California Transportation Center and the Institute of Urban and Regional Development at the University of California at Berkeley. Major findings of the domestic and international research include the following:

- Development impacts are generally clustered within one-quarter to one-half mile of a station. While impacts fall sharply beyond walking distance from the station, rail sometimes contributes to community development miles from the station. Therefore, the development effects of HST are expected to be concentrated in the immediate area of the station, with the majority generally located within walking distance of the station.

- Due to the less frequent nature and longer travel time of intercity trips, the development effects not located within walking distance of the station can be expected to extend somewhat further from the station than those associated with rapid transit or commuter rail stations. With good local area circulation, such as public transit routes or shuttles, strong development effects could extend for up to one mile or more.

- The general development trend seems to be that rail attracts offices first, offices attract residents, and residents attract retail, although local market conditions can influence a different pattern. In many cases studied, rail improvements reacted to residential development in the larger community made possible by expressway development.

- Industries that benefit from wide commuter-sheds of potential employees or customers are most attracted to rail station area development. In general, industries that need large numbers of highly skilled and specialized employees, including FIRE, pharmaceuticals, government, and professional services, are most attracted to rail. In at least one case, a university located a campus near the rail station to attract students from a wide region. Furthermore, there is evidence of "back office" operations being attracted to station-area developments.

- There is a lag time between completion of HST and construction of new real estate investments. It is expected that space will be added gradually in the years following introduction of HST service, with little market response in advance of opening. The long cycle for property development in infill and urban areas (five to 10 years), particularly for large scale or complex mixed use projects, contributes to this delay. Waiting until HST construction is complete also reduces investment risk associated with potential delays in initiating HST service.

- Given the limited land available for development in a station area, as an area gets more developed, rental rates rise. Higher rents, in turn, make higher density (and higher cost) development economically viable

- Regulatory-style efforts by cities to encourage increased density and a mix of land uses near rail stations have been effective in creating denser developments with a perception of greater intrinsic value and reducing public opposition to density where it is coordinated with rail investment. Tax incentives for large business relocations have attracted high-intensity developments to house those large tenants.

- To be successful in attracting development, rail station areas need excellent highway access. Even with HST service, the majority of people living, shopping, or working in the station area will likely come from the surrounding community or points not served by rail. When good highway access is present, a rail station can provide a focus for high-intensity development.

Estimation of Employment-Related Land Requirements

Estimates of land required to accommodate employment uses were developed using a statistical analysis based on current development patterns in the State of California, adjusted to reflect expected densification trends over time. The approach provides an estimate of the employment growth that can fit within the currently urbanized areas of each county, and the consumption of currently undeveloped land for any remaining employment growth. The approach is sensitive to differences in development patterns between areas within California, development needs and history by industry, density potential based on location within an urban area, and density patterns related to either market conditions or regulatory strategies.

The analytical process consisted of three main steps:

1. **Development of an employment density profile –** This profile, which was developed using zip code-level employment data, expressed the range of current employment densities by industrial class for different county groupings and specific subregions within the counties.

2. **Employment allocation –** Forecasted employment was allocated to subregions in each county in a step-wise fashion allocation through the use of the density profiles and the existing employment in each county.

3. **Land consumption tabulation –** Employment acreage requirements were estimated for each county by comparing the urbanized acreage for employment-related land use in each future year with the current urbanized acreage.

This process is described in greater detail in Appendix G.

Estimation of Residential Land Requirements

The California Urbanization and Biodiversity Analysis (CURBA) model was used to allocate population growth to various locations in each county and to predict raw land consumption resulting from residential construction. CURBA is a spatial decision support system developed within the ESRI ArcGIS software package by the University of California at Berkeley's Institute of Urban and Regional Development.

CURBA uses a number of historically-calibrated spatial statistical models to assign projected population residential growth to various locations in and around the existing urban area. By modifying CURBA's employment distribution, infill allocation, and raw land development densities to reflect information generated as part of the employment analysis, the package was used to estimate the nature and amount of raw land consumption under the various alternatives. The basic steps in the residential analysis included:

- **Model calibration –** A spatial-statistical model of historical development patterns was calibrated using detailed land coverage inventories from the California Department of Conservation.

- **Development probabilities –** A binomial logit model was used to estimate development probability for undeveloped sites based on a site's job accessibility, physical and land use constraints, characteristics of adjacent sites, and local land use policies and regulations.

- **Residential infill and redevelopment –** A cross-sectional regression model was used to relate current county infill shares to remaining supplies of undeveloped land, and then project population shares for future analysis years.

- **Growth allocation –** Another cross-sectional regression model was used to project land use densities in each county based on remaining supplies of undeveloped land.

Population growth was then allocated to individual sites in order of development probabilities until all population growth is accommodated.

This iterative process is described in greater detail in Appendix H.

4.0 Statewide and Regional Growth Effects

4.0 Statewide and Regional Growth Effects

This chapter describes results of the statewide and regional economic modeling process for the 2020 and 2035 analysis years. The key results presented in this chapter include county- and regional-level population and employment forecasts for each system alternative and HST design option. The first section compares each system alternative in terms of statewide population and employment, while the second section discusses results for the HST design options. The third section compares the system alternatives in terms of regional and county-level forecasts. The fourth section discusses the sensitivity of these results to the base population and employment forecasts. Finally, the fifth section provides an overview of the significance of these population and employment forecasts. The discussion in this chapter is supplemented by detailed tables of employment forecasts by industry group in Appendix I.

■ 4.1 Statewide Comparison of System Alternatives

Table 4.1 displays year 2020 population and employment forecasts for the three system alternatives, while Table 4.2 provides the same information for year 2035. Tables 4.3 and 4.4 display population and employment growth rates for years 2020 and 2035, respectively; the growth rates in these tables are referenced to the 2002 existing conditions. Tables 4.5 and 4.6 compare growth rates for the Modal and HST Alternatives relative to the No-Project Alternative for years 2020 and 2035, respectively. All tables summarize results by primary analysis county,[1] REMI region (as described in Section 3.0), and statewide.

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[1] The primary analysis counties include counties that have a high-speed train station with the HST Alternative, or highway or aviation improvements within the Modal Alternative. The "rest of state" category includes all other California counties, including counties from the Bay Area (Napa, Marin, and Sonoma); Los Angeles (Ventura); and Sacramento (El Dorado, Placer, Sutter, and Yuba) regions that do not meet the definition of a primary analysis county.

Table 4.1 Year 2020 Employment and Population
County and Regional Totals

	Employment				Population			
	2002	2020			2002	2020		
County	Existing Conditions	No-Project	Modal	HST (base)	Existing Conditions	No-Project	Modal	HST (base)
Alameda	899,901	1,212,510	1,217,782	1,220,964	1,513,356	1,793,139	1,796,473	1,800,288
Contra Costa	483,812	689,388	692,375	694,884	953,069	1,104,725	1,106,628	1,109,296
San Francisco	771,599	868,839	873,995	882,165	795,577	750,904	753,835	758,621
San Mateo	501,712	610,977	614,240	620,905	770,102	855,506	857,638	861,905
Santa Clara	1,281,313	1,675,268	1,683,933	1,694,441	1,826,362	2,196,750	2,202,011	2,212,919
Solano	164,167	242,957	244,256	245,738	416,292	552,105	552,944	554,460
Bay Area*	4,102,504	5,299,940	5,326,580	5,359,096	6,274,758	7,253,129	7,269,529	7,297,489
Madera	59,123	96,090	96,380	96,816	135,695	224,567	224,672	224,926
Merced	90,070	114,429	115,239	119,085	224,709	319,785	320,038	333,092
Sacramento	756,313	984,230	988,331	1,008,258	1,259,423	1,651,765	1,653,266	1,653,432
San Joaquin	268,325	412,117	416,166	418,184	607,331	884,375	885,560	885,126
Stanislaus	216,690	301,832	303,675	307,929	485,123	708,950	709,550	711,687
Yolo	113,826	150,767	151,010	152,155	170,518	225,321	225,415	225,644
North Central Valley*	1,504,347	2,059,465	2,070,801	2,102,426	2,882,799	4,014,763	4,018,501	4,033,906
Fresno	429,002	602,722	608,287	613,863	839,582	1,114,403	1,117,596	1,122,171
Kern	322,774	453,251	454,741	456,151	712,198	1,073,748	1,074,705	1,076,218
Kings	51,289	66,645	66,977	67,222	132,092	186,611	186,793	187,042
Tulare	181,804	224,268	224,586	224,832	397,616	569,896	570,077	570,327
South Central Valley*	984,869	1,346,886	1,354,590	1,362,068	2,081,488	2,944,658	2,949,171	2,955,758
Los Angeles	5,452,745	6,699,802	6,744,419	6,754,661	10,007,779	11,575,693	11,605,474	11,615,933
Orange	1,878,327	2,656,136	2,677,435	2,673,920	2,910,976	3,431,869	3,444,031	3,438,194
Riverside	656,839	1,076,667	1,082,474	1,075,097	1,681,186	2,773,431	2,777,053	2,748,494
San Bernardino	731,420	1,128,243	1,133,392	1,144,253	1,816,378	2,747,213	2,750,383	2,786,344
San Diego	1,754,622	2,606,408	2,631,070	2,638,258	3,066,423	3,917,001	3,931,336	3,935,842
Southern California*	10,473,953	14,167,255	14,268,790	14,286,189	19,482,742	24,445,207	24,508,277	24,524,807
Rest of State	2,722,219	3,563,921	3,551,838	3,566,922	5,080,451	6,790,870	6,788,168	6,806,197
Statewide Total	**19,787,892**	**26,437,467**	**26,572,600**	**26,676,703**	**35,802,238**	**45,448,627**	**45,533,646**	**45,618,157**

Source: Cambridge Systematics, Inc., 2003.
*Only includes counties within a region that have a high-speed rail station with the HST Alternative, or highway or aviation improvements within the Modal Alternative. Other counties are included in "Rest of State" grouping.

Table 4.2 Year 2035 Employment and Population
County and Regional Totals

	Employment				Population			
	2002	2035			2002	2035		
County	**Existing Conditions**	**No-Project**	**Modal**	**HST (base)**	**Existing Conditions**	**No-Project**	**Modal**	**HST (base)**
Alameda	899,901	1,273,557	1,282,085	1,287,498	1,513,356	2,004,985	2,016,457	2,027,153
Contra Costa	483,812	723,006	727,862	732,194	953,069	1,227,082	1,233,977	1,242,398
San Francisco	771,599	918,391	926,652	939,928	795,577	705,619	716,763	738,467
San Mateo	501,712	636,802	642,062	652,637	770,102	930,793	938,120	954,896
Santa Clara	1,281,313	1,785,474	1,799,462	1,816,613	1,826,362	2,498,528	2,516,989	2,546,153
Solano	164,167	251,790	253,901	256,421	416,292	661,762	664,753	669,301
Bay Area*	4,102,504	5,589,020	5,632,024	5,685,292	6,274,758	8,028,769	8,087,059	8,178,369
Madera	59,123	149,752	150,520	151,305	135,695	312,674	313,763	315,340
Merced	90,070	164,898	167,050	174,870	224,709	421,175	423,879	449,329
Sacramento	756,313	1,037,902	1,048,771	1,097,473	1,259,423	2,002,082	2,017,634	2,061,967
San Joaquin	268,325	502,655	513,877	518,037	607,331	1,153,260	1,165,636	1,164,907
Stanislaus	216,690	383,284	388,080	397,966	485,123	920,782	927,228	934,388
Yolo	113,826	174,955	175,594	178,343	170,518	278,724	279,696	282,497
North Central Valley*	1,504,347	2,413,446	2,443,892	2,517,994	2,882,799	5,088,697	5,127,837	5,208,428
Fresno	429,002	688,186	698,767	709,524	839,582	1,411,889	1,424,683	1,441,577
Kern	322,774	522,862	526,022	528,661	712,198	1,468,936	1,474,792	1,479,979
Kings	51,289	74,942	75,555	75,945	132,092	244,219	244,801	245,137
Tulare	181,804	248,178	248,800	249,205	397,616	761,893	762,731	763,163
South Central Valley*	984,869	1,534,168	1,549,145	1,563,334	2,081,488	3,886,937	3,907,007	3,929,857
Los Angeles	5,452,745	7,406,409	7,482,434	7,502,773	10,007,779	13,302,934	13,415,179	13,454,864
Orange	1,878,327	2,870,740	2,906,688	2,901,398	2,910,976	3,910,017	3,959,760	3,950,770
Riverside	656,839	1,162,051	1,172,098	1,163,500	1,681,186	3,983,299	3,999,336	3,965,826
San Bernardino	731,420	1,220,510	1,229,392	1,245,657	1,816,378	3,798,899	3,813,001	3,867,414
San Diego	1,754,622	2,867,144	2,909,471	2,921,375	3,066,423	4,789,883	4,852,256	4,870,658
Southern California*	10,473,953	15,526,855	15,700,084	15,734,703	19,482,742	29,785,032	30,039,532	30,109,532
Rest of State	2,722,219	3,809,552	3,791,825	3,815,877	5,080,451	8,420,610	8,411,353	8,475,119
Statewide Total	**19,787,892**	**28,873,042**	**29,116,970**	**29,317,201**	**35,802,238**	**55,210,045**	**55,572,788**	**55,901,305**

Source: Cambridge Systematics, Inc., 2003.
*Only includes counties within a region that have a high-speed rail station with the HST Alternative, or highway or aviation improvements within the Modal Alternative. Other counties are included in "Rest of State" grouping.

Table 4.3 Year 2020 Employment and Population
Percentage Change from Year 2002 Existing Conditions

	Employment				**Population**			
		2020				**2020**		
County	**2002 Existing**	**No-Project**	**Modal**	**HST Base**	**2002 Existing**	**No-Project**	**Modal**	**HST Base**
Alameda	0%	35%	35%	36%	0%	18%	19%	19%
Contra Costa	0%	42%	43%	44%	0%	16%	16%	16%
San Francisco	0%	13%	13%	14%	0%	-6%	-5%	-5%
San Mateo	0%	22%	22%	24%	0%	11%	11%	12%
Santa Clara	0%	31%	31%	32%	0%	20%	21%	21%
Solano	0%	48%	49%	50%	0%	33%	33%	33%
Bay Area*	0%	29%	30%	31%	0%	16%	16%	16%
Madera	0%	63%	63%	64%	0%	65%	66%	66%
Merced	0%	27%	28%	32%	0%	42%	42%	48%
Sacramento	0%	30%	31%	33%	0%	31%	31%	31%
San Joaquin	0%	54%	55%	56%	0%	46%	46%	46%
Stanislaus	0%	39%	40%	42%	0%	46%	46%	47%
Yolo	0%	32%	33%	34%	0%	32%	32%	32%
North Central Valley*	0%	37%	38%	40%	0%	39%	39%	40%
Fresno	0%	40%	42%	43%	0%	33%	33%	34%
Kern	0%	40%	41%	41%	0%	51%	51%	51%
Kings	0%	30%	31%	31%	0%	41%	41%	42%
Tulare	0%	23%	24%	24%	0%	43%	43%	43%
South Central Valley*	0%	37%	38%	38%	0%	41%	42%	42%
Los Angeles	0%	23%	24%	24%	0%	16%	16%	16%
Orange	0%	41%	43%	42%	0%	18%	18%	18%
Riverside	0%	64%	65%	64%	0%	65%	65%	63%
San Bernardino	0%	54%	55%	56%	0%	51%	51%	53%
San Diego	0%	49%	50%	50%	0%	28%	28%	28%
Southern California*	0%	35%	36%	36%	0%	25%	26%	26%
Rest of State	0%	31%	30%	31%	0%	34%	34%	34%
Statewide Total	**0%**	**34%**	**34%**	**35%**	**0%**	**27%**	**27%**	**27%**

Source: Cambridge Systematics, Inc., 2003.

* Only includes counties within a region that have a high-speed train station with the HST Alternative, or highway or aviation improvements within the Modal Alternative. Other counties are included in "Rest of State" grouping.

Table 4.4 Year 2035 Employment and Population
Percentage Change from Year 2002 Existing Conditions

County	Employment				Population			
		2035				2035		
	2002 Existing	No-Project	Modal	HST Base	2002 Existing	No-Project	Modal	HST Base
Alameda	0%	42%	42%	43%	0%	32%	33%	34%
Contra Costa	0%	49%	50%	51%	0%	29%	29%	30%
San Francisco	0%	19%	20%	22%	0%	-11%	-10%	-7%
San Mateo	0%	27%	28%	30%	0%	21%	22%	24%
Santa Clara	0%	39%	40%	42%	0%	37%	38%	39%
Solano	0%	53%	55%	56%	0%	59%	60%	61%
Bay Area*	0%	36%	37%	39%	0%	28%	29%	30%
Madera	0%	153%	155%	156%	0%	130%	131%	132%
Merced	0%	83%	85%	94%	0%	87%	89%	100%
Sacramento	0%	37%	39%	45%	0%	59%	60%	64%
San Joaquin	0%	87%	92%	93%	0%	90%	92%	92%
Stanislaus	0%	77%	79%	84%	0%	90%	91%	93%
Yolo	0%	54%	54%	57%	0%	63%	64%	66%
North Central Valley*	0%	60%	62%	67%	0%	77%	78%	81%
Fresno	0%	60%	63%	65%	0%	68%	70%	72%
Kern	0%	62%	63%	64%	0%	106%	107%	108%
Kings	0%	46%	47%	48%	0%	85%	85%	86%
Tulare	0%	37%	37%	37%	0%	92%	92%	92%
South Central Valley*	0%	56%	57%	59%	0%	87%	88%	89%
Los Angeles	0%	36%	37%	38%	0%	33%	34%	34%
Orange	0%	53%	55%	54%	0%	34%	36%	36%
Riverside	0%	77%	78%	77%	0%	137%	138%	136%
San Bernardino	0%	67%	68%	70%	0%	109%	110%	113%
San Diego	0%	63%	66%	66%	0%	56%	58%	59%
Southern California*	0%	48%	50%	50%	0%	53%	54%	55%
Rest of State	0%	40%	39%	40%	0%	66%	66%	67%
Statewide Total	**0%**	**46%**	**47%**	**48%**	**0%**	**54%**	**55%**	**56%**

Source: Cambridge Systematics, Inc., 2003.

* Only includes counties within a region that have a high-speed train station with the HST Alternative, or highway or aviation improvements within the Modal Alternative. Other counties are included in "Rest of State" grouping.

Table 4.5 Year 2020 Employment and Population
Percentage Change from No-Project

	Employment				Population			
		2020				2020		
County	**2002 Existing**	**No-Project**	**Modal**	**HST Base**	**2002 Existing**	**No-Project**	**Modal**	**HST Base**
Alameda	n/a	0.0%	0.4%	0.7%	n/a	0.0%	0.2%	0.4%
Contra Costa	n/a	0.0%	0.4%	0.8%	n/a	0.0%	0.2%	0.4%
San Francisco	n/a	0.0%	0.6%	1.5%	n/a	0.0%	0.4%	1.0%
San Mateo	n/a	0.0%	0.5%	1.6%	n/a	0.0%	0.2%	0.7%
Santa Clara	n/a	0.0%	0.5%	1.1%	n/a	0.0%	0.2%	0.7%
Solano	n/a	0.0%	0.5%	1.1%	n/a	0.0%	0.2%	0.4%
Bay Area*	n/a	0.0%	0.5%	1.1%	n/a	0.0%	0.2%	0.6%
Madera	n/a	0.0%	0.3%	0.8%	n/a	0.0%	0.0%	0.2%
Merced	n/a	0.0%	0.7%	4.1%	n/a	0.0%	0.1%	4.2%
Sacramento	n/a	0.0%	0.4%	2.4%	n/a	0.0%	0.1%	0.1%
San Joaquin	n/a	0.0%	1.0%	1.5%	n/a	0.0%	0.1%	0.1%
Stanislaus	n/a	0.0%	0.6%	2.0%	n/a	0.0%	0.1%	0.4%
Yolo	n/a	0.0%	0.2%	0.9%	n/a	0.0%	0.0%	0.1%
North Central Valley*	n/a	0.0%	0.6%	2.1%	n/a	0.0%	0.1%	0.5%
Fresno	n/a	0.0%	0.9%	1.8%	n/a	0.0%	0.3%	0.7%
Kern	n/a	0.0%	0.3%	0.6%	n/a	0.0%	0.1%	0.2%
Kings	n/a	0.0%	0.5%	0.9%	n/a	0.0%	0.1%	0.2%
Tulare	n/a	0.0%	0.1%	0.3%	n/a	0.0%	0.0%	0.1%
South Central Valley*	n/a	0.0%	0.6%	1.1%	n/a	0.0%	0.2%	0.4%
Los Angeles	n/a	0.0%	0.7%	0.8%	n/a	0.0%	0.3%	0.3%
Orange	n/a	0.0%	0.8%	0.7%	n/a	0.0%	0.4%	0.2%
Riverside	n/a	0.0%	0.5%	-0.1%	n/a	0.0%	0.1%	-0.9%
San Bernardino	n/a	0.0%	0.5%	1.4%	n/a	0.0%	0.1%	1.4%
San Diego	n/a	0.0%	0.9%	1.2%	n/a	0.0%	0.4%	0.5%
Southern California*	n/a	0.0%	0.7%	0.8%	n/a	0.0%	0.3%	0.3%
Rest of State	n/a	0.0%	-0.3%	0.1%	n/a	0.0%	0.0%	0.2%
Statewide Total	**n/a**	**0.0%**	**0.5%**	**0.9%**	**n/a**	**0.0%**	**0.2%**	**0.4%**

Source: Cambridge Systematics, Inc., 2003.
* Only includes counties within a region that have a high-speed train station with the HST Alternative, or highway or aviation improvements within the Modal Alternative. Other counties are included in “Rest of State” grouping.